

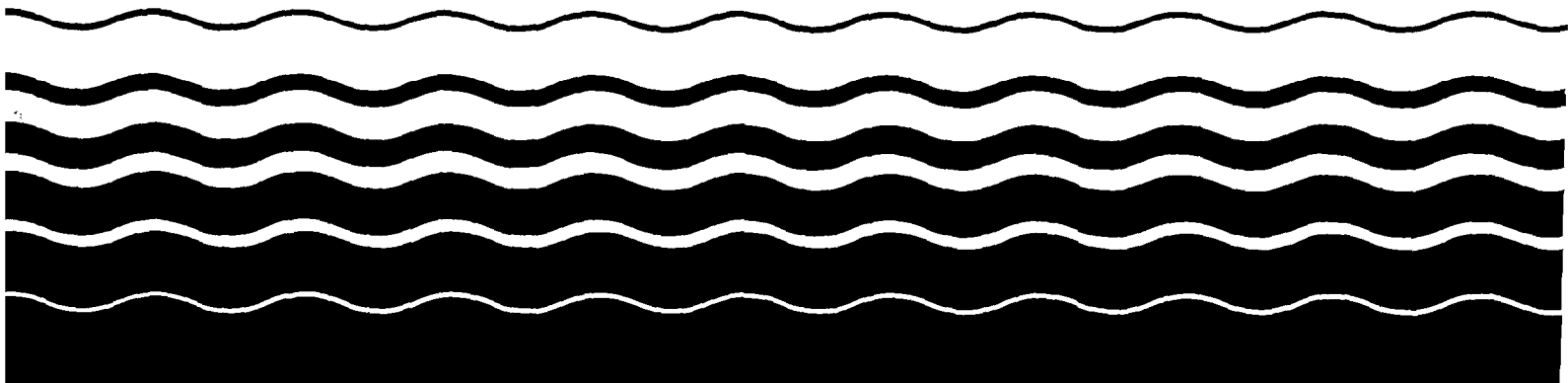
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EPA

Combined Sewer Overflows

Guidance For Long-Term Control Plan



Combined Sewer Overflows

Guidance for Long-Term Control Plan

**U.S. Environmental Protection Agency
Office of Wastewater Management
Washington, DC 20460**

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 31 1995

OFFICE OF
WATER

MEMORANDUM

SUBJECT: Guidance for Long Term Control Plan

FROM: Michael B. Cook,
Office of Wastewater Management (4201)

TO: Interested Parties

I am pleased to provide you with the Environmental Protection Agency's (EPA's) guidance document on the development and implementation of a long-term control plan for combined sewer overflows (CSOs). This document is one of several being prepared to foster implementation of EPA's CSO Control Policy. The CSO Control Policy, issued on April 11, 1994, establishes a national approach under the National Pollutant Discharge Elimination System (NPDES) permit program for controlling discharges into the nation's waters from combined sewer systems.

To facilitate implementation of the CSO Control Policy, EPA is preparing guidance documents that can be used by NPDES permitting authorities, affected municipalities, and their consulting engineers in planning and implementing CSO controls that will ultimately comply with the requirements of the Clean Water Act.

This document has been prepared to provide guidance to municipalities on how to develop a comprehensive long-term control plan that recognizes the site specific nature of CSOs and their impacts on receiving water bodies. The final plan should include water quality based control measures that are technically feasible, affordable, and consistent with the CSO Control Policy.

This guidance has been reviewed extensively within the Agency as well as by municipal groups, environmental groups, and other CSO stakeholders. I am grateful to all who participated in its preparation and review, and believe that it will further the implementation of the CSO Control Policy.

If you have any questions regarding the manual or its distribution, please call Joseph Mauro in the Office of Wastewater Management, at (202) 260-1140.



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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Combined sewer systems (CSSs) are wastewater collection systems designed to carry sanitary sewage (consisting of domestic, commercial, and industrial wastewater) and storm water (surface drainage from rainfall or snowmelt) in a single pipe to a treatment facility. CSSs serve about 43 million people in approximately 1,100 communities nationwide. Most of these communities are located in the Northeast and Great Lakes regions. During dry weather, CSSs convey domestic, commercial, and industrial wastewater. In periods of rainfall or snowmelt, total wastewater flows can exceed the capacity of the CSS and/or treatment facilities. When this occurs, the CSS is designed to overflow directly to surface water bodies, such as lakes, rivers, estuaries, or coastal waters. These overflows—called combined sewer overflows (CSOs)—can be a major source of water pollution in communities served by CSSs.

Because CSOs contain untreated domestic, commercial, and industrial wastes, as well as surface runoff, many different types of contaminants can be present. Contaminants may include pathogens, oxygen-demanding pollutants, suspended solids, nutrients, toxics, and floatable matter. Because of these contaminants and the volume of the flows, CSOs can cause a variety of adverse impacts on the physical characteristics of surface water, impair the viability of aquatic habitats, and pose a potential threat to drinking water supplies. CSOs have been shown to be a major contributor to use impairment and aesthetic degradation of many receiving waters and have contributed to shellfish harvesting restrictions, beach closures, and even occasional fish kills.

1.2 HISTORY OF THE CSO CONTROL POLICY

Historically, the control of CSOs has proven to be extremely complex. This complexity stems partly from the difficulty in quantifying CSO impacts on receiving water quality and the site-specific variability in the volume, frequency, and characteristics of CSOs. In addition, the financial considerations for communities with CSOs can be significant. The U.S. Environmental

Protection Agency (EPA) estimates the CSO abatement costs for the 1,100 communities served by CSSs to be approximately \$41.2 billion.

To address these challenges, EPA's Office of Water issued a National Combined Sewer Overflow Control Strategy on August 10, 1989 (54 *Federal Register* 37370). This Strategy reaffirmed that CSOs are point source discharges subject to National Pollutant Discharge Elimination System (NPDES) permit requirements and to Clean Water Act (CWA) requirements. The CSO Strategy recommended that all CSOs be identified and categorized according to their status of compliance with these requirements. It also set forth three objectives:

- Ensure that if CSOs occur, they are only as a result of wet weather
- Bring all wet weather CSO discharge points into compliance with the technology-based and water quality-based requirements of the CWA
- Minimize the impacts of CSOs on water quality, aquatic biota, and human health.

In addition, the CSO Strategy charged all States with developing state-wide permitting strategies designed to reduce, eliminate, or control CSOs.

Although the CSO Strategy was successful in focusing increased attention on CSOs, it fell short in resolving many fundamental issues. In mid-1991, EPA initiated a process to accelerate implementation of the Strategy. The process included negotiations with representatives of the regulated community, State regulatory agencies, and environmental groups. These negotiations were conducted through the Office of Water Management Advisory Group. The initiative resulted in the development of a CSO Control Policy, which was published in the *Federal Register* on April 19, 1994 (59 *Federal Register* 18688). The intent of the CSO Control Policy is to:

- Provide guidance to permittees with CSOs, NPDES permitting and enforcement authorities, and State water quality standards (WQS) authorities

- Ensure coordination among the appropriate parties in planning, selecting, designing, and implementing CSO management practices and controls to meet the requirements of the CWA
- Ensure public involvement during the decision-making process.

The CSO Control Policy contains provisions for developing appropriate, site-specific NPDES permit requirements for all CSSs that overflow due to wet weather events. It also announces an enforcement initiative that requires the immediate elimination of overflows that occur during dry weather and ensures that the remaining CWA requirements are complied with as soon as possible.

1.3 KEY ELEMENTS OF THE CSO CONTROL POLICY

The CSO Control Policy contains four key principles to ensure that CSO controls are cost-effective and meet the requirements of the CWA:

- Provide clear levels of control that would be presumed to meet appropriate health and environmental objectives
- Provide sufficient flexibility to municipalities, especially those that are financially disadvantaged, to consider the site-specific nature of CSOs and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements
- Allow a phased approach for implementation of CSO controls considering a community's financial capability
- Review and revise, as appropriate, WQS and their implementation procedures when developing long-term CSO control plans to reflect the site-specific wet weather impacts of CSOs.

In addition, the CSO Control Policy clearly defines expectations for permittees, State WQS authorities, and NPDES permitting and enforcement authorities. These expectations include the following:

- Permittees should immediately implement the nine minimum controls (NMC), which are technology-based actions or measures designed to reduce CSOs and their effects on receiving water quality, as soon as practicable but no later than January 1, 1997.
- Permittees should give priority to environmentally sensitive areas.
- Permittees should develop long-term control plans (LTCPs) for controlling CSOs. A permittee may use one of two approaches: 1) demonstrate that its plan is adequate to meet the water quality-based requirements of the CWA ("demonstration approach"), or 2) implement a minimum level of treatment (e.g., primary clarification of at least 85 percent of the collected combined sewage flows) that is presumed to meet the water quality-based requirements of the CWA, unless data indicate otherwise ("presumption approach").
- WQS authorities should review and revise, as appropriate, State WQS during the CSO long-term planning process.
- NPDES permitting authorities should consider the financial capability of permittees when reviewing CSO control plans.

Exhibit 1-1 illustrates the roles and responsibilities of permittees, NPDES permitting and enforcement authorities, and State WQS authorities.

In addition to these key elements and expectations, the CSO Control Policy also addresses important issues such as ongoing or completed CSO control projects, public participation, small communities, and watershed planning.

Exhibit 1-1. Roles and Responsibilities

Permittee	NPDES Permitting Authority	NPDES Enforcement Authority	State WQS Authorities
<ul style="list-style-type: none"> Evaluate and implement NMC Submit documentation of NMC implementation by January 1, 1997 Develop LTCP and submit for review to NPDES permitting authority Support the review of WQS in CSO-impacted receiving water bodies Comply with permit conditions based on narrative WQS Implement selected CSO controls from LTCP Perform post-construction compliance monitoring Reassess overflows to sensitive areas Coordinate all activities with NPDES permitting authority, State WQS authority, and State watershed personnel 	<ul style="list-style-type: none"> Reassess/revise CSO permitting strategy Incorporate into Phase I permits CSO-related conditions (e.g., NMC implementation and documentation and LTCP development) Review documentation of NMC implementation Coordinate review of LTCP components throughout the LTCP development process and accept/approve permittee's LTCP Coordinate the review and revision of WQS as appropriate Incorporate into Phase II permits CSO-related conditions (e.g., continued NMC implementation and LTCP implementation) Incorporate implementation schedule into an appropriate enforceable mechanism Review implementation activity reports (e.g., compliance schedule progress reports) 	<ul style="list-style-type: none"> Ensure that CSO requirements and schedules for compliance are incorporated into appropriate enforceable mechanisms Monitor adherence to January 1, 1997, deadline for NMC implementation and documentation Take appropriate enforcement action against dry weather overflows Monitor compliance with Phase I, Phase II, and post-Phase II permits and take enforcement action as appropriate 	<ul style="list-style-type: none"> Review WQS in CSO-impacted receiving water bodies Coordinate review with LTCP development Revise WQS as appropriate: <ul style="list-style-type: none"> Development of site-specific criteria Modification of designated use to <ul style="list-style-type: none"> Create partial use reflecting specific situations Define use more explicitly Temporary variance from WQS

1.4 GUIDANCE TO SUPPORT IMPLEMENTATION OF THE CSO CONTROL POLICY

To help permittees and NPDES permitting and WQS authorities implement the provisions of the CSO Control Policy, EPA is developing the following guidance documents:

- *Combined Sewer Overflows—Guidance for Long-Term Control Plan* (EPA, 1995a)
- *Combined Sewer Overflows—Guidance for Nine Minimum Controls* (EPA, 1995b)
- *Combined Sewer Overflows—Guidance for Screening and Ranking* (EPA, 1995c)
- *Combined Sewer Overflows—Guidance for Monitoring and Modeling* (EPA, 1995d)
- *Combined Sewer Overflows—Guidance for Financial Capability Assessment* (EPA, 1995e)
- *Combined Sewer Overflows—Guidance for Funding Options* (EPA, 1995f)
- *Combined Sewer Overflows—Guidance for Permit Writers* (EPA, 1995g)
- *Combined Sewer Overflows—Questions and Answers on Water Quality Standards and the CSO Program* (EPA, 1995h).

1.5 GOAL OF THIS GUIDANCE DOCUMENT

The main goal of this document is to provide technical support to assist municipalities in the development of technically feasible, affordable, and comprehensive LTCPs consistent with the objectives of the CSO Control Policy.

1.5.1 Target Audience

The primary audience of this document is municipal officials who are developing LTCPs. This document might be of particular benefit to small and medium-sized municipalities, which might not have access to the resources and expertise available to larger municipalities. A secondary audience is EPA and State officials, as well as NPDES permit writers, who can refer to this document when reviewing and evaluating LTCPs. Although the document presents the engineering concepts required for the preparation of certain aspects of the LTCPs, it has been written for the non-engineer.

Certain aspects of EPA's CSO Control Policy are explained in more detail in other guidance documents. This LTCP guidance document summarizes information from those documents, where appropriate. It emphasizes the role of public participation and agency interaction, the use of monitoring and modeling data to develop and evaluate CSO control strategies, and the role of financial capability in the selection and implementation of CSO controls.

1.5.2 Document Organization

Chapter 2 describes the characterization of the CSS, including the analysis of existing data and system monitoring and modeling, establishment of the existing baseline conditions, and integration of the NMC with the LTCP. Chapter 2 also includes a case study that documents how a CSO community characterized its system. Chapter 3 presents methodologies for the development and evaluation of CSO control alternatives. It discusses the role of public participation, the "presumption" and "demonstration" approaches to developing alternatives, identification of CSO control goals and alternatives to achieve those goals, and other aspects of alternatives development, such as preliminary sizing, cost/performance considerations, siting issues, and operating strategies. The chapter concludes with two case studies describing the development and evaluation of CSO control alternatives. Chapter 4 discusses the final step of the LTCP: the selection and implementation of the long-term controls. This step includes development of an operational plan, identification of financing options and funding sources, development of the implementation schedule and post-construction compliance monitoring program, and re-evaluation and update of the final plan.

1.6 LONG-TERM PLANNING APPROACH SUMMARY

The overall planning approach consists of three major steps: system characterization, development and evaluation of alternatives, and selection and implementation of the controls. Each of these steps is discussed separately and in detail in subsequent chapters. The remainder of this section provides general guidance on developing the program structure, which municipalities usually need to proceed with the various aspects of the LTCP. Section 1.6 also

introduces several key topics that EPA feels are critical in developing an LTCP consistent with the CSO Control Policy.

The CSO Control Policy lists nine elements that should be addressed as appropriate in either one, or all three steps of the overall planning approach. Public participation should be addressed in all three steps, for example, while an implementation schedule might be addressed in two of the steps.

As listed in the Policy, the nine elements of the LTCP are:

1. **Characterization, monitoring, and modeling** activities as the basis for selection and design of effective CSO controls
2. **A public participation** process that actively involves the affected public in the decision-making to select long-term CSO controls
3. Consideration of **sensitive areas** as the highest priority for controlling overflows
4. **Evaluation of alternatives** that will enable the permittee, in consultation with the NPDES permitting authority, WQS authority, and the public, to select CSO controls that will meet CWA requirements
5. **Cost/performance considerations** to demonstrate the relationships among a comprehensive set of reasonable control alternatives
6. **Operational plan** revisions to include agreed-upon long-term CSO controls
7. **Maximization of treatment at the existing POTW treatment plant** for wet weather flows
8. **An implementation schedule** for CSO controls
9. **A post-construction compliance monitoring program** adequate to verify compliance with water quality-based CWA requirements and ascertain the effectiveness of CSO controls.

Exhibit 1-2 presents the recommended planning approach described in this document, along with cross-references to the appropriate chapters of this document and sections of the CSO Control Policy. The planning approach is generally intended to be followed sequentially;

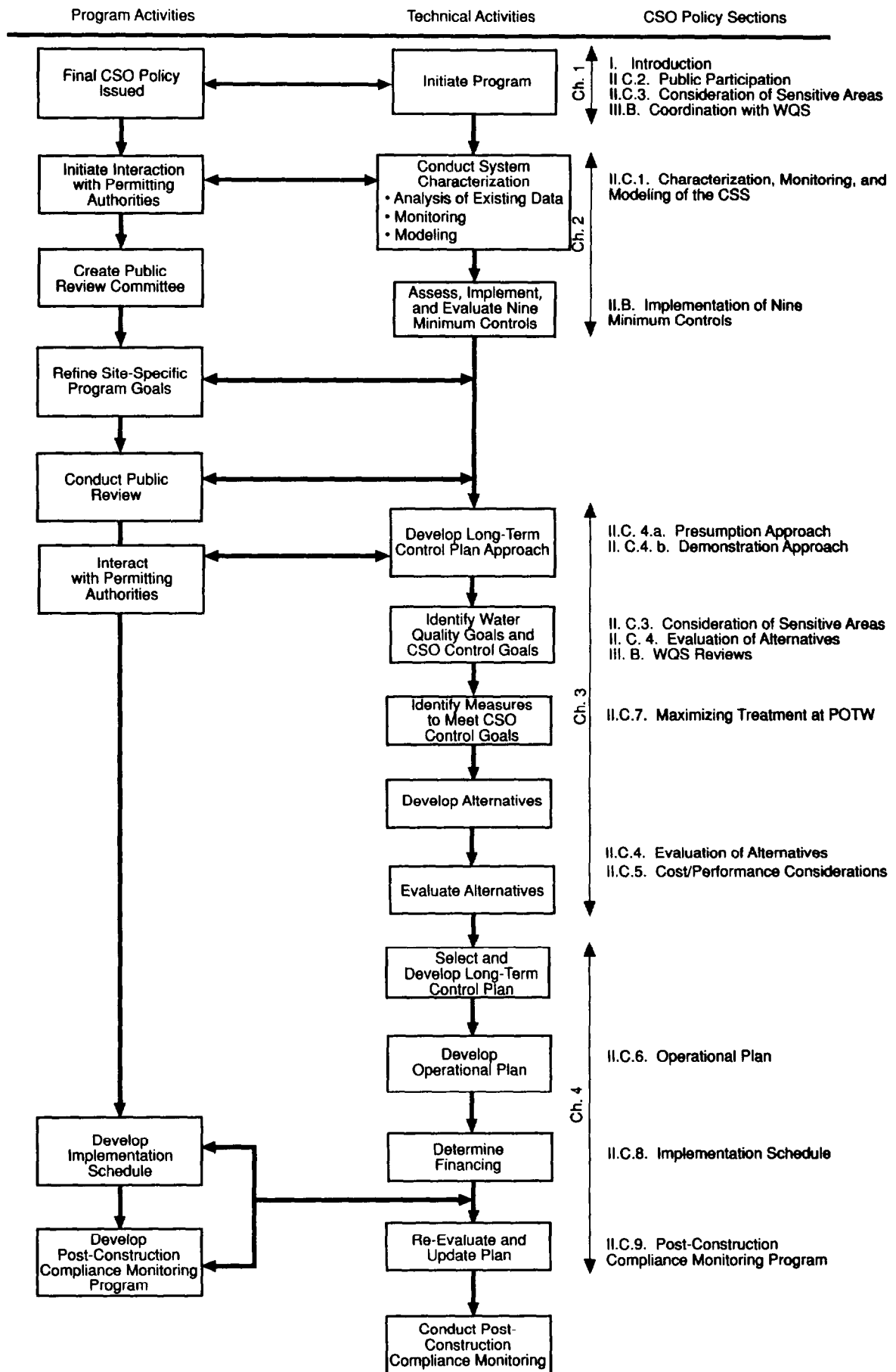


Exhibit 1-2. Long-Term CSO Control Planning Approach

however, it can be altered depending on specific circumstances (e.g., municipalities with limited combined systems or municipalities that have already conducted efforts to control CSOs may select a different approach). Exhibit 1-2 distinguishes program activities from technical activities. Program activities are tasks that will provide overall program structure, coordination, and management; technical activities are the specific engineering tasks necessary to develop the LTCP. Although the planning approach described in this document is intended to address CSOs, it might also include information needed to address other pollution sources, such as storm water and nonpoint sources.

The CSO Control Policy encourages municipalities to develop, and permit writers to evaluate, LTCPs on a watershed management basis (see Section 1.6.5). Municipalities should try to evaluate all sources of pollution (e.g., point sources, CSOs, storm water, CSOs) during system characterization (Chapter 2) and, wherever possible, develop control strategies on a watershed basis in coordination with the NPDES permitting authority.

Exhibit 1-3 provides an example of a typical CSO Control Policy implementation timeline. As noted in the CSO Control Policy, municipalities should develop and submit their LTCPs *"...as soon as practicable, but generally within two years after the date of the NPDES permit provision, Section 308 information request, or enforcement action requiring the permittee to develop the plan"* (II.C). As illustrated in Exhibit 1-3, however, *"NPDES authorities may establish a longer timetable for completion of the long-term CSO control plan on a case-by-case basis to account for site-specific factors which may influence the complexity of the planning process"* (II.C).

1.6.1 Initial Activities

An important first step is development of an administrative structure for CSO control planning. This involves organizing a CSO program team; establishing communication, coordination, and control procedures for team members and other participants; identifying tasks and associated resource needs; and scheduling tasks.

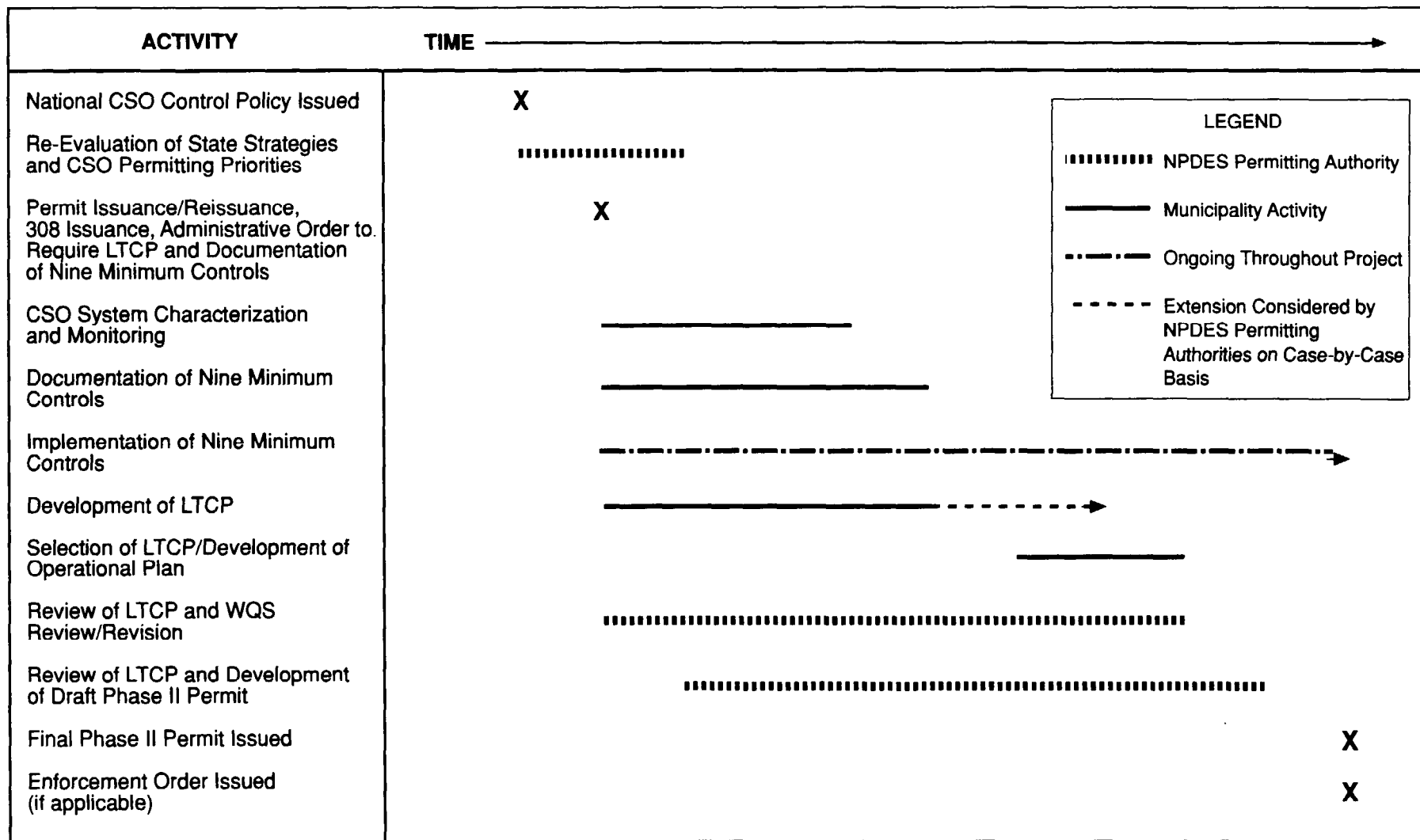


Exhibit 1-3. Example of a CSO Control Policy Implementation Timeline

The program team should include all entities who have a stake in the program outcome, and it should be sufficiently multidisciplinary to address the myriad of engineering, economic, environmental, and institutional issues that will be raised during the development of the LTCP. The team generally will have to prepare a plan for funding the program and will develop a program for public information, education, and involvement.

The team should contain municipal personnel such as public works, wastewater treatment plant operations, and engineering personnel, as well as parks, conservation, and other officials involved in such issues as utilities, land use and zoning, development review, and environmental issues. It should include Federal and State regulatory officials, local political officials, and the general public, including rate payers and environmental interests. Depending on the size and complexity of the program, private consulting resources might also be necessary.

The municipality also should establish management tasks such as estimating, forecasting, budgeting, and controlling costs; planning, estimating, and scheduling program activities; developing and evaluating quality control practices; and developing and controlling the program scope. Some municipalities already have project management and control procedures in place; in other cases, particularly where several agencies are involved, it is appropriate to develop management tasks specifically for the CSO control program.

1.6.2 Public Participation and Agency Interaction

Establishing early communication with both the public and regulatory agencies is an important first step in the long-term planning approach and crucial to the success of a CSO control program. The importance of public participation is stressed in the CSO Control Policy: *"In developing its long-term CSO control plan, the permittee will employ a public participation process that actively involves the affected public in the decision-making to select the long-term CSO controls"* (II.C.2). Given the potential for significant expenditures of public funds for CSO control, public support is key to CSO program success. By informing the public early in the planning process about the scope and goals of the program and continuing public involvement during development, evaluation, and selection of the control strategy, issues and potential

conflicts can be identified and addressed more expeditiously, minimizing the potential for prolonged delay or additional cost.

Citizen Advisory Committees (CACs) can serve as liaisons among municipal officials, NPDES permitting agencies, and the general public. Public meetings and public hearings can provide an effective forum to present technical information and obtain input from interested individuals and organizations. It is worthwhile to gauge public acceptance of potential CSO alternatives before completing the engineering evaluation of each alternative and to incorporate input from the public meetings into the selection of a recommended plan. Impacts on user fees and tax rates are also important to communicate as early as possible in the LTCP development. After the municipality has selected a recommended plan, public involvement will continue to be useful. Particular attention should be given to informing residents and businesses that would be affected by any construction associated with project implementation.

If Federal or State funding is involved, the municipality might be required to submit a work plan to the regulatory agency. The work plan should include an approach for public participation. Public participation requirements for Federal- or State-funded projects are given in 40 CFR Part 25.

The CSO Control Policy emphasizes that "*State WQS authorities, NPDES authorities, EPA regional offices and permittees should meet early and frequently throughout the long-term planning process*" (III.A). It also describes several issues involving regulatory agencies that could affect the development of the LTCP, including the review and appropriate revision of water quality standards (WQS) and agreement on the data, analyses, monitoring, and modeling necessary to support the development of the LTCP.

1.6.3 Coordination with State Water Quality Standards Authority

A primary objective of the LTCP is to develop and evaluate a range of CSO control alternatives sufficient to meet WQS, including attainment and protection of designated uses on CSO-impacted receiving waters. To ensure that the LTCP meets this objective, State WQS

authorities should be involved early in the LTCP development process. This will give participants an opportunity to review the proposed nature and extent of data and information to be collected during LTCP development. Such data and information can be used in assessing the attainability of the designated uses (through a use attainability analysis) and possibly revisiting designated use classifications for the CSO-impacted waters (e.g., by defining uses more precisely).

The CSO Control Policy recognizes that the review and appropriate revision of WQS is an integral part of LTCP development, and describes the options available to States ". . . to adapt their WQS, and implementation procedures to reflect site-specific conditions including those related to CSOs" (III.B). Such options include:

- Adopting partial uses to reflect situations where a significant storm event precludes the use from occurring
- Adopting seasonal uses to reflect that certain uses do not occur during certain seasons (e.g., swimming does not occur in winter)
- Defining a use with greater specificity (e.g., warm-water fishery in place of aquatic life protection); or
- Granting a temporary variance to a specific discharger in cases where maintaining existing standards for other dischargers is preferable to downgrading WQS.

Whenever such changes are proposed, the State must ensure downstream uses are protected, and other uses not affected by the storm or season are protected. The State must also ensure that the quality of the water is improved or protected.

EPA encourages States with CSOs to work within their current regulatory framework, using existing flexibility to consider wet weather conditions in reviewing their WQS.

Early in the process, the municipality should identify data needs, monitoring protocols, and models for system characterization, as well as develop a compliance monitoring program. The water quality impacts of the existing CSOs can then be evaluated to establish the existing

baseline condition against which the effectiveness of the selected CSO controls can be measured, and to predict whether or not WQS will be attained after LTCP implementation. If this information indicates that WQS are not likely to be attained after LTCP implementation, it can be used to identify additional CSO control alternatives necessary to attain WQS or to determine whether non-CSO sources of pollution are contributing to nonattainment. A TMDL could be used to evaluate more stringent controls on non-CSO dischargers for the receiving water and pollutant(s) of concern.

Municipalities and States should share and coordinate information with other municipalities within the same watershed. This information, along with storm water and other point and nonpoint source data, provides an opportunity for NPDES permitting authorities and permittees to implement a comprehensive watershed management approach, including TMDLs. This same information also provides an opportunity for municipalities to coordinate the development and implementation of their individual LTCPs with one another.

1.6.4 Integration of Current CSO Control Efforts

Some municipalities have already begun, and perhaps completed, CSO abatement activities. In these cases, "*...portions of [the] Policy may not apply, as determined on a case by case basis...*" (I.C). The CSO Control Policy outlines three such scenarios: (1) municipalities that have completed or substantially completed construction of CSO facilities, (2) municipalities that have developed or are implementing a CSO control program pursuant to an existing permit or enforcement order, and (3) municipalities that have constructed CSO facilities but have failed to meet applicable WQS. Municipalities that fall under these scenarios should coordinate with their NPDES permitting authorities to determine the scope of the required long-term planning activities.

In cases where significant work has been conducted, municipalities would present an overview of their programs to illustrate the impact of CSO improvements on a system-wide basis. Exhibit 1-4 presents an example of an assessment of existing and future CSO controls. In this example, system characterization was completed in 1989 and the system improvements

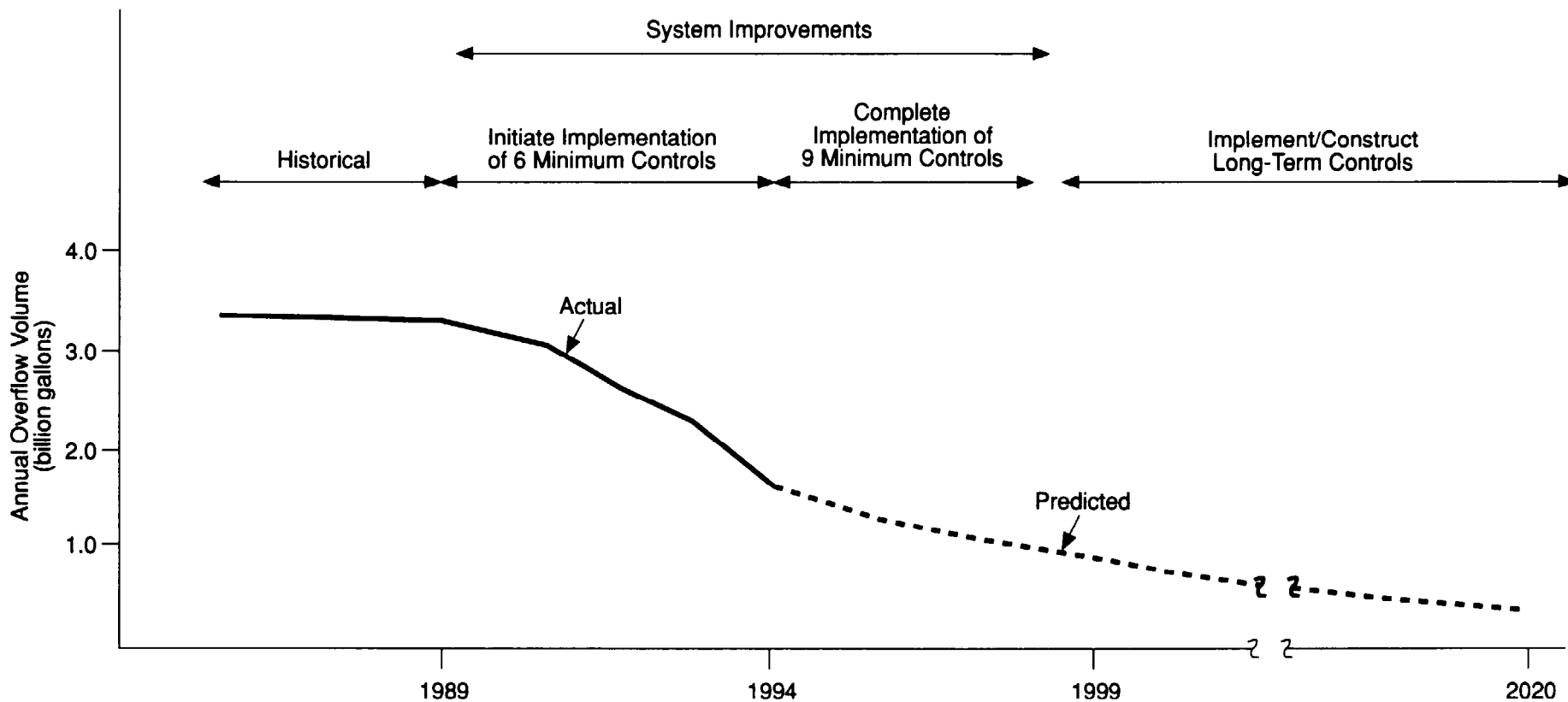


Exhibit 1-4. Impact of CSO Program Improvements on System-Wide CSOs

shown as taking place between 1989 and 1999 include both minimum controls and other actions, such as collection system and POTW improvements and upgrades, that will result in CSO control.

1.6.5 Watershed Approach to CSO Control Planning

The CSO Control Policy acknowledges the importance of watershed planning in the long-term control of CSOs by encouraging the permit writer "*...to evaluate water pollution control needs on a watershed management basis and coordinate CSO control efforts with other point and nonpoint source control activities*" (I.B). The watershed approach is also discussed in the section of the CSO Control Policy addressing the demonstration approach to CSO control (II.B.4.b; see also Chapter 3 of this document), which, in recommending that NPDES permitting authorities allow a demonstration of attainment of WQS, provides for consideration of natural background conditions and pollution sources other than CSOs, promoting the development of total maximum daily loads (TMDLs).

EPA's Office of Water is committed to supporting States that want to implement a comprehensive statewide watershed management approach. EPA has convened a Watershed Management Policy Committee, consisting of senior managers, to oversee the reorientation of all EPA water programs to support watershed approaches.

Of particular importance to CSO control planning and management is the *NPDES Watershed Strategy* (EPA, 1994b). This strategy outlines national objectives and implementation activities to integrate the NPDES program into the broader watershed protection approach. The Strategy also supports the development of statewide basin management as part of an overall watershed management approach. Statewide basin management is an overall framework for integrating and coordinating water resource management efforts basin-by-basin throughout an entire State. This will result in development and implementation of basin management plans that meet stated environmental goals.

The sources of watershed pollution and impairment, in addition to CSOs, are varied and include other point source discharges; discharges from storm drains; overland runoff; habitat destruction; land use activities, such as agriculture and construction; erosion; and septic systems and landfills. The benefits to implementing a watershed approach are significant and include:

- Consideration of all important sources of pollution or impairment
- Closer ties to receiving water benefits
- Greater flexibility
- Greater cost effectiveness (through coordination of monitoring programs, for example)
- Fostering of prevention as well as control
- Fairer allocation of resources and responsibilities.

The major advantage in using a watershed-based approach to develop an LTCP is that it allows the site-specific determination of the relative impacts of CSOs and non-CSO sources of pollution on water quality. For some receiving water reaches within a watershed, CSOs could well be less significant contributors to nonattainment than storm water or upstream sources. In such cases, a large expenditure on CSO control could result in negligible improvement in water quality.

Exhibit 1-5 outlines a conceptual framework for conducting CSO planning in a watershed context. This approach can be used to identify CSO controls for each receiving water segment based on the concepts of watershed management and use attainability.

The first activity in the process is to define baseline conditions, including WQS and receiving water quality, and to delineate the watershed. The receiving water assessment includes consideration of the major sources of pollutant loads in the watershed: CSOs, storm water discharges, agricultural loads, and other point sources. Using information from an assessment of baseline receiving water conditions, a range of water quality goals for each receiving water

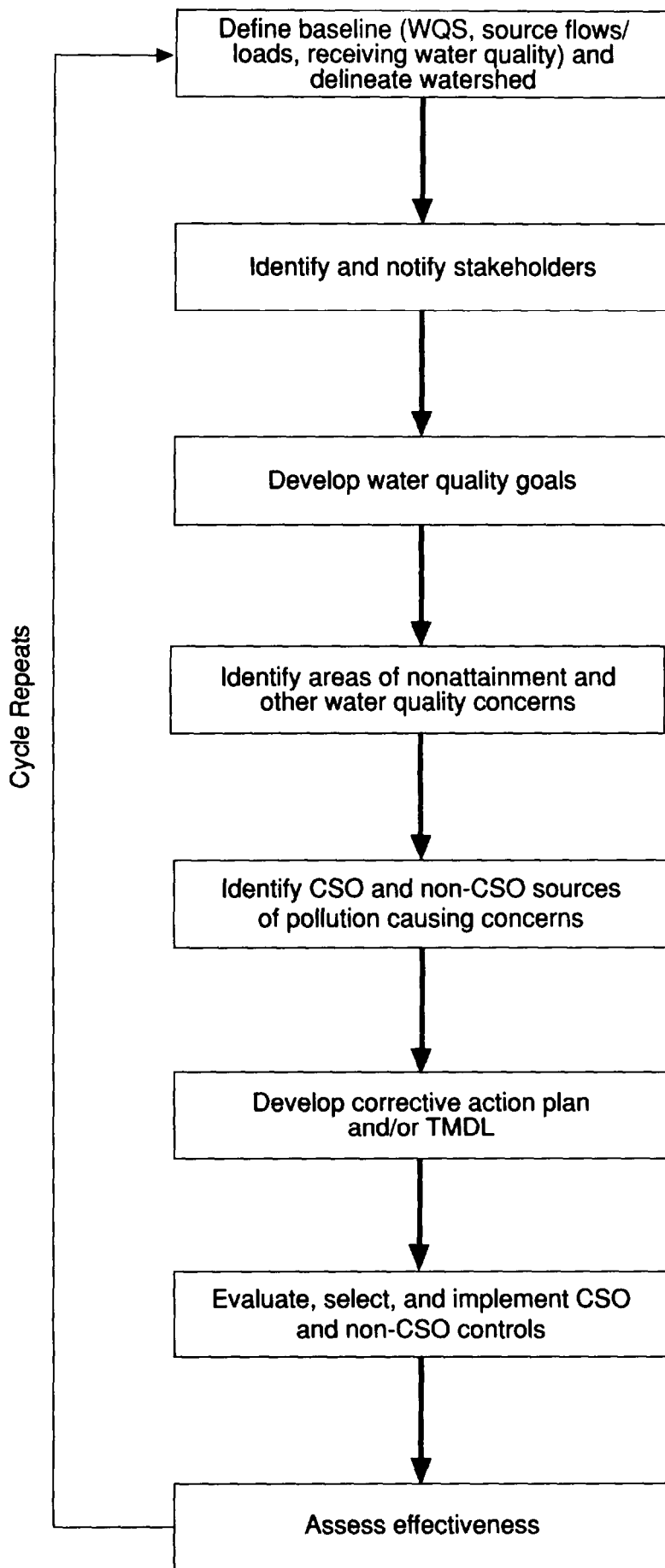


Exhibit 1-5. Watershed-Based CSO Control Planning Approach for a Receiving Water Segment

segment is established. At this stage of the planning approach, all affected stakeholders should be notified.

The next step in this approach is to first identify the overall watershed concerns, and then prioritize the cause or causes for each specific problem. The flows and loads from the pollutant sources are estimated from modeled flows generated for various hydrologic conditions and from pollutant concentrations generated from statistical analyses of available site-specific data. In the approach illustrated in Exhibit 1-5, a receiving water model would be used to assess the impact of CSOs and storm water on selected receiving water segments and to quantify the impacts of CSO sources only, storm water and upstream sources only, and a combination of CSO, storm water, and upstream sources on the attainment of WQS for each segment. It is possible that in several receiving water segments, pollution contributed by CSOs will be only a fraction of the total pollutant loads from other sources. In these segments, even complete elimination of CSOs would not achieve the water quality goals because the other sources prevent the attainment of beneficial uses. The CSO control goals are developed under the assumption that if the other sources were remediated by the appropriate responsible parties, then the CSO control goals would be stringent enough for water quality goals to be met.

Once CSO control goals to achieve the water quality goals in each receiving water segment are established, engineering and hydraulic analyses are conducted to develop, evaluate, and select a corrective action plan. Following the implementation of the CSO and non-CSO controls, their effectiveness must be assessed. In some cases, implementation of CSO and non-CSO controls might require a phased approach, whereby the process illustrated in Exhibit 1-5 could repeat itself over several cycles.

1.6.6 Small System Considerations

As EPA acknowledged in the CSO Control Policy, compliance with the scope of the LTCP may be difficult for some small combined sewer systems. For this reason, *"At the discretion of the NPDES Authority, jurisdictions with populations under 75,000 may not need to complete each of the formal steps outlined in Section II.C. of the Policy...."* (I.D). At a

minimum, however, all small municipalities should be required to develop LTCPs that will provide for the attainment of WQS and that include the following elements:

- Implementation of the NMC (II.B)
- Public participation (II.C.2)
- Consideration of sensitive areas (II.C.3)
- Post-construction compliance monitoring program (II.C.9).

A municipality with a population less than 75,000 should consult with both the NPDES permitting and WQS authorities to ensure that its LTCP addresses the elements noted above and can show that the CSO control program will meet the objectives of the CWA.

1.6.7 Sensitive Areas

In accordance with the CSO Control Policy, municipalities should give highest priority to controlling overflows to receiving waters considered sensitive. As part of developing the LTCP, municipalities should be required to identify all sensitive water bodies and the CSO outfalls that discharge to them. The designated beneficial uses of the receiving water bodies will help identify sensitive areas (EPA, 1995g). Sensitive areas are identified by the NPDES authority, in coordination with other State and Federal agencies as appropriate. According to the CSO Control Policy, sensitive areas include:

- Outstanding National Resource Waters
- National Marine Sanctuaries
- Waters with threatened or endangered species or their designated critical habitat
- Primary contact recreation waters, such as bathing beaches
- Public drinking water intakes or their designated protection areas
- Shellfish beds.

In accordance with the CSO Control Policy, the LTCP should give highest priority to the prohibition of new or significantly increased overflows (whether treated or untreated) to

designated sensitive areas. If physically possible and economically achievable, existing overflows to sensitive areas should be eliminated or relocated unless elimination or relocation creates more environmental impact than continued discharge (with additional treatment necessary to meet WQS) to the sensitive area.

1.6.8 Measures of Success

As municipalities, NPDES permitting authorities, and the public embark on a coordinated effort to address CSOs, serious consideration should be given to "measures of success." For purposes of this discussion, measures of success are objective, measurable, and quantifiable indicators that illustrate trends and results over time. Measures of success generally fall into four categories:

- Administrative measures that track programmatic activities;
- End-of-pipe measures that show trends in the discharge of CSS flows to the receiving water body, such as reduction of pollutant loadings, the frequency of CSOs, and the duration of CSOs;
- Receiving water body measures that show trends of the conditions in the water body to which the CSO occurs, such as trends in dissolved oxygen levels and sediment oxygen demand; and
- Ecological, human health, and use measures that show trends in conditions relating to the use of the water body, its effect on the health of the population that uses the water body, and the health of the organisms that reside in the water body, including beach closures, attainment of designated uses, habitat improvements, and fish consumption advisories. Such measures would be coordinated on a watershed basis as appropriate.

EPA's experience has shown that measures of success should include a balanced mix of measures from each of the four categories.

As municipalities begin to collect data and information on CSOs and CSO impacts, they have an important opportunity to establish a solid understanding of the "baseline" conditions and to consider what information and data are necessary to evaluate and demonstrate the results of

CSO control. Municipalities and NPDES permitting authorities should agree early in the planning stages on the data and information that will be used to measure success.

The following list presents examples of potential measures of success for CSO control, organized by the four categories discussed above:

- **Administrative measures:**

- Number of NPDES permits or other enforceable mechanisms requiring implementation of the NMC
- Number of NPDES permits or other enforceable mechanisms issued requiring development of LTCPs
- Number of municipalities meeting technology-based requirements in permits
- Number of municipalities meeting water quality-based requirements in permits
- Compliance rates with CSO requirements in permits
- Dollars spent/committed for CSO control measures
- Nature and extent of CSO controls constructed/implemented.

- **End-of-pipe measures:**

- Number of dry weather overflows eliminated
- Number of CSO outfalls eliminated
- Reduction in frequency of CSOs
- Reduction in volume of CSOs
- Reduction in pollutant loadings (conventional and toxics) in CSOs.

- **Receiving water body measures:**

- Reduced in-stream concentrations of pollutants
- Attainment of narrative or numeric water quality criteria.

- **Ecological, human health, and use measures:**

- Improved access to water resources
- Reduced flooding and drainage problems
- Reduced costs and treatment of drinking water
- Economic benefits (e.g., value of increased tourism, value of shellfish harvested from beds previously closed)
- Restored habitat
- Improved biodiversity indices
- Reduction in beach closures
- Reduction in fish consumption advisories.

(Note: These measures are included as examples only; EPA is supporting the development of national measures of success for CSOs through a cooperative agreement with the Association of Metropolitan Sewerage Agencies (AMSA). The results of AMSA's efforts are expected to be available in late 1995.)

When establishing CSO measures of success, municipalities and NPDES permitting authorities should consider a number of important factors:

- **Data quality and reproducibility**—Can consistent and comparable data be collected that allow for comparison over time (e.g., trend analysis) and from different sources (e.g., watershed analysis)? Do standard data collection procedures exist?
- **Costs**—What is the cost of collecting and analyzing the information?
- **Comprehensibility to the public**—Will the public understand and agree with the measures?
- **Availability**—Is it reasonably feasible for the data to be collected?
- **Objectivity**—Would different individuals evaluate the data or information similarly, free from bias or subjectivity?
- **Other uses in wet-weather and watershed planning and management**—Can the data be used by State agencies as support for other CSO and watershed planning efforts?

Careful selection, collection, analysis, and presentation of information related to measures of success should allow municipalities, States, and EPA to demonstrate the benefits and long-term successes of CSO control efforts. Notwithstanding the effort to develop national measures of success, municipalities should identify measures, document baseline conditions, and collect appropriate information that demonstrates the cause and effect of CSO impacts and the benefits and success of CSO control. It is likely that measures of success will vary from municipality to municipality and will be determined by the environmental impacts of CSOs on site-specific basis.